

**Northern Range Extension for *Aster yukonensis***  
*in Gates of the Arctic National Park and Preserve, Alaska*

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### INTRODUCTION

In July 1996, the National Park Service (NPS) continued its search for the rare plant *Aster yukonensis* Cronquist. Little data are available to document the range and distribution of *A. yukonensis*; therefore, this species is listed as a Species of Concern by the U.S. Fish and Wildlife Service (Endangered Species Act 1973). The NPS is mandated by the Endangered Species Act (1973) to protect plant or animal species listed as Threatened, Endangered or Species of Concern. To meet this federal mandate, Gates of the Arctic National Park and Preserve has undertaken the task of locating and mapping *A. yukonensis* within its boundaries. Resource management staff at Gates of the Arctic National Park and Preserve mapped range extensions of the species along the Middle Fork and North Fork of the Koyukuk River in 1994 and 1995, respectively. In 1996, our survey was conducted along the headwaters of the Hunt Fork of the John River. Results of the 1996 survey documented the extension of *A. yukonensis* even farther into the central Brooks Range. The success of the 1996 survey was due in part to the cheerful and dedicated assistance of Mike Haubert, who quickly learned how to hunt for asters.

*Aster yukonensis*, or Yukon Aster, is a member of the Compositae, or Daisy family. The flower resembles the common Siberian Aster (*A. sibiricus*) with lavender colored "petals" (which are the ligules of ray flowers on the margin of this composite inflorescence) and yellow centers (disk flowers). Although the Siberian Aster occasionally has narrow leaves, the very long and narrow clasping leaves of the Yukon Aster are distinctive. In addition, the Yukon Aster tends to have a paler green leaf and often a brighter yellow flower center than its sister aster. For positive identification, however, a hand lens is required to confirm the presence of densely glandular phyllaries. These glands look like tiny amber-colored particles of sand on the narrow green bracts at the base of the inflorescence.

## STUDY AREA

Gates of the Arctic National Park and Preserve (GAAR) lies north of the Arctic Circle (66° 33' N latitude) in the central Brooks Range, Alaska (Fig. 1). Two climatic zones occur in the park and preserve: the subarctic zone at lower elevations south of the continental divide and the arctic zone to the north and at high elevations. Precipitation is low within the park and preserve and yearly averages fall between 30 - 45 cm in the west and 13 - 25 cm in the north (National Park Service 1986). Snowfall averages south of the divide range between 152 - 203 cm and averages of 89 - 127 cm are typical in the north. Yearly temperatures in the south fluctuate from an average July maximum of 21° C (70° F) to an average January minimum of -34° C (-30° F). Temperatures in the north fluctuate from an average July maximum of 18° C (65° F) to an average February minimum of -23° C (-10° F).

Boreal forest, tundra, and shrub thicket are the major vegetation communities in the park and preserve (National Park Service 1986). Boreal forest covers the southern flanks and valleys of the Brooks Range and is composed of black spruce (*Picea mariana*), white spruce (*P. glauca*), paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*), and balsam poplar (*Populus balsamifera*). Tall dense willow (*Salix* spp.)/alder (*Alnus* spp.) thickets up to 3.5 m in height occur along stream channels and gravel bars.

Several large rivers originate within the mountains of the park. The 1996 *A. yukonensis* survey was conducted along the headwaters of the Hunt Fork John River, which lies in the central region of the park (Fig. 2). This area is at the northern extent of the boreal forest; spruce trees grow only at the lowest elevations in the valley, along the river, and on lower mountain slopes. In August 1994, the river bed was scoured by a flood, denuding much of the river bar vegetation. Gravel bars not destroyed during the flood remain vegetated, serving as seed sources for the newly developing gravel bars. Dominant gravel bar species in this area include *Salix alaxensis*, *Alnus crispa*, *Aster sibiricus*, *Hedysarum alpinum*, *Parnassia palustris*, *Castilleja caudata*, *Equisetum* spp., *Eriophorum* spp., *Carex* spp. and *Agropyron* sp.

## METHODS

On July 17-19, 1996, we searched for *A. yukonensis* on vegetated river bars along a 6-mile stretch of the Hunt Fork directly below the confluence of Agiak and Loon creeks (Fig. 3). Searches were concentrated in the habitat favored by *A. yukonensis*: sand bars with an accumulation of silt, generally found lining the edges of sloughs or along the bottoms and sides of old sloughs. The survey was conducted on foot; we walked slowly, zigzagging across the search area, and counted each *A. yukonensis* plant found. Only on one gravel bar, where the Yukon Asters were particularly abundant, was not every plant counted. On this bar, we counted as many of the plants as possible, resulting in a minimum estimate. A 1-mile stretch along Agiak Creek above the confluence with Loon Creek was also checked for *A. yukonensis*. We took photographs to document the habitat where we found *A. yukonensis*. These photographs are on file at the GAAR headquarters in Fairbanks.

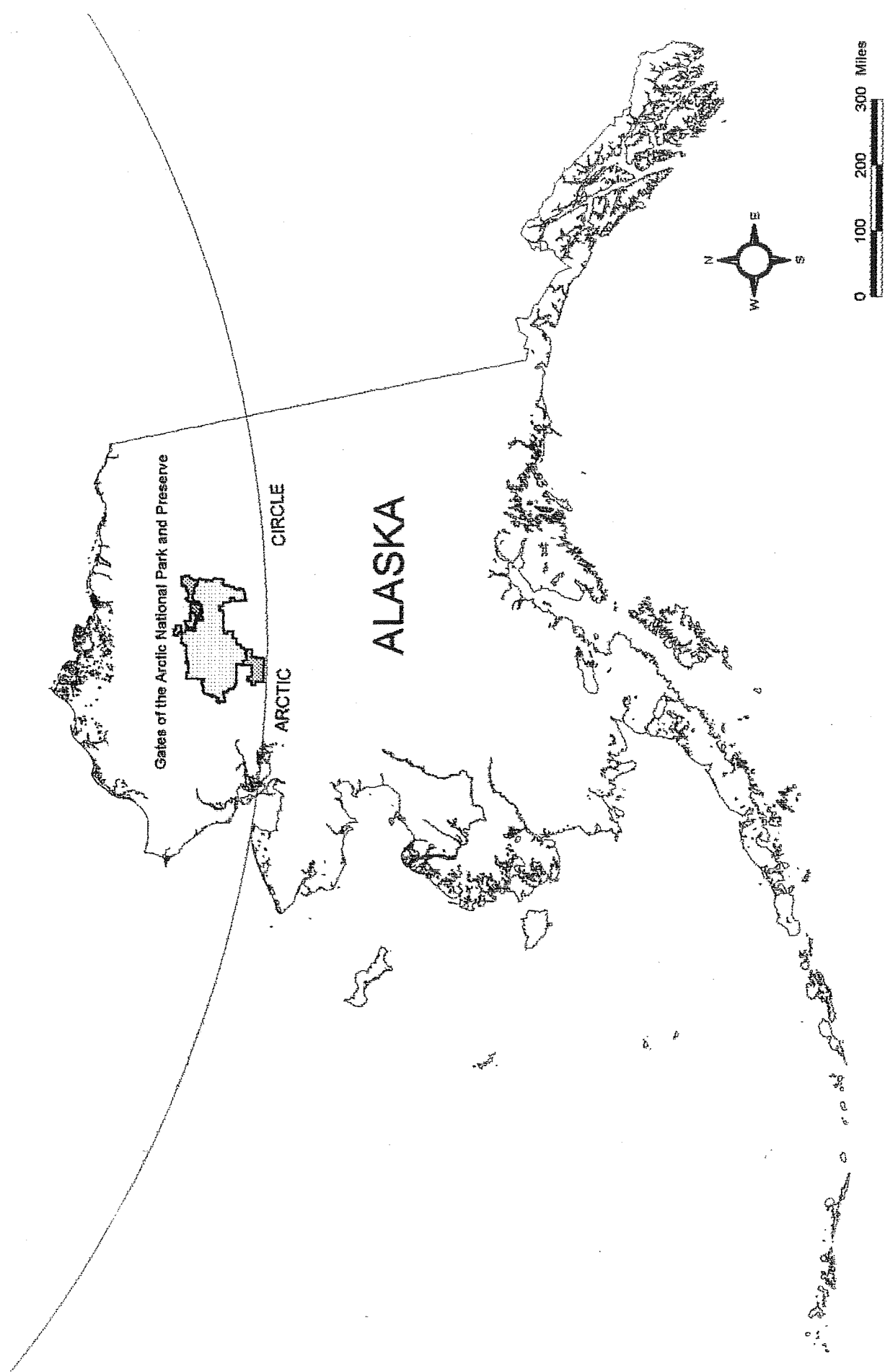


Fig. 1. Gates of the Arctic National Park and Preserve, located in the central Brooks Range north of the Arctic Circle.

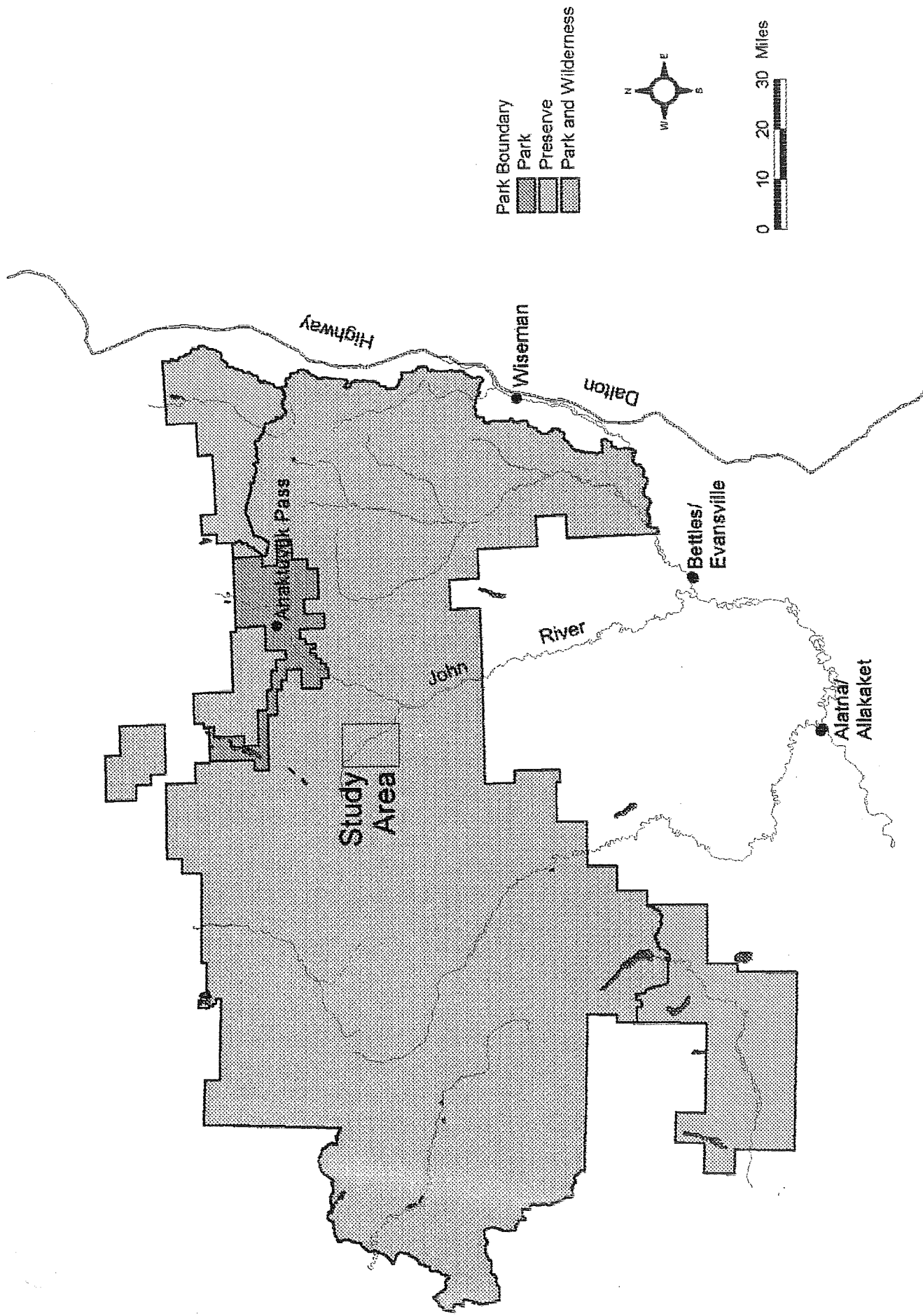


Fig. 2. Location of *Aster yulkonensis* survey, Gates of the Arctic National Park and Preserve, Alaska, July 17-19, 1996.

## RESULTS

We found Yukon Asters on the Hunt Fork at a latitude of 67° 53' 37" N, the most northerly population of this species recorded to date. Overall, we counted 294 *A. yukonensis* plants during the survey. Because we did not count all the plants, our results provide a minimum estimate of the total number of plants in our search area. A gravel bar immediately below the confluence of Walkaround Creek and the Hunt Fork contained 77% of the total number of *A. yukonensis* found during the entire survey (Fig. 3). Plant distribution was very sparse and scattered along the first 5 miles of the river, between Loon Creek and Walkaround Creek, averaging 5 plants per bar where *A. yukonensis* was found ( $n = 3$ ). Larger and more robust populations ( $n = 3$ ), averaging 93 plants per bar, were found below the Walkaround Creek confluence. A 1-mile section of Agiak Creek supported habitat suitable for Yukon Asters; however, no plants were located.

We collected specimen for the GAAR herbarium from the largest population found (225+ individuals). The specimen was growing in silty sand on a sand bar about 1 m above water level. The vegetation type in the immediate vicinity of the collected specimen was open low scrub (Viereck et al. 1992), with shrubs reaching a height of about 1.5 m. Plants associated with the collected specimen were: *Salix alaxensis*, *Populus balsamifera*, *Alnus crispa*, *Artemisia tellesii*, *Aster sibiricus*, *Hedysarum alpinum*, and *Agropyron boreale*. The Yukon Asters on this bar were growing in bunches and singly. They were found growing in the more open areas nearest the river, and also in the wooded, brushy areas, which lay closer to the bank.

## DISCUSSION

Over the past 3 years, the known range of *A. yukonensis* has expanded from 2 disjunct populations (one near Kluane Lake, Yukon Territory, the other on the Koyukuk River west of Bettles, Alaska (Murray and Lipkin 1987; Hulten 1968)) to populations in river valleys spanning the central and western Brooks Range. Other than the 2 populations near Kluane Lake and Bettles, populations of *A. yukonensis* have been documented in 5 areas in northern Alaska: the Middle and North Forks of the Koyukuk River and the Hunt Fork of the John River in Gates of the Arctic National Park and Preserve, the Great Kobuk Sand Dunes in Kobuk National Park (Hunt, pers. com.), and the North Fork of the Squirrel River (Meyers, pers. com.).

Yukon Asters have been found in open terrain, such as in wide valleys or low hills, in the subarctic regions south of the continental divide. They grow in the low swales of the Great Kobuk Sand Dunes at 100 - 200 ft above sea level (ASL) and in mountain valleys at 1,500 ft ASL along the Hunt Fork of the John River. Wherever it is found, *A. yukonensis* grows in sandy areas or on mudflats, often beside a large river.

Our work during the last 3 summers has provided information for a better understanding of the habitat requirements of *A. yukonensis*. They were not found in organic soils nor in high, dry alpine areas. They appear to be associated with disturbance, growing in areas frequented by floods or shifting substrate. However, what are the limiting factors for *A. yukonensis* in habitat that appears suitable? When substrate and

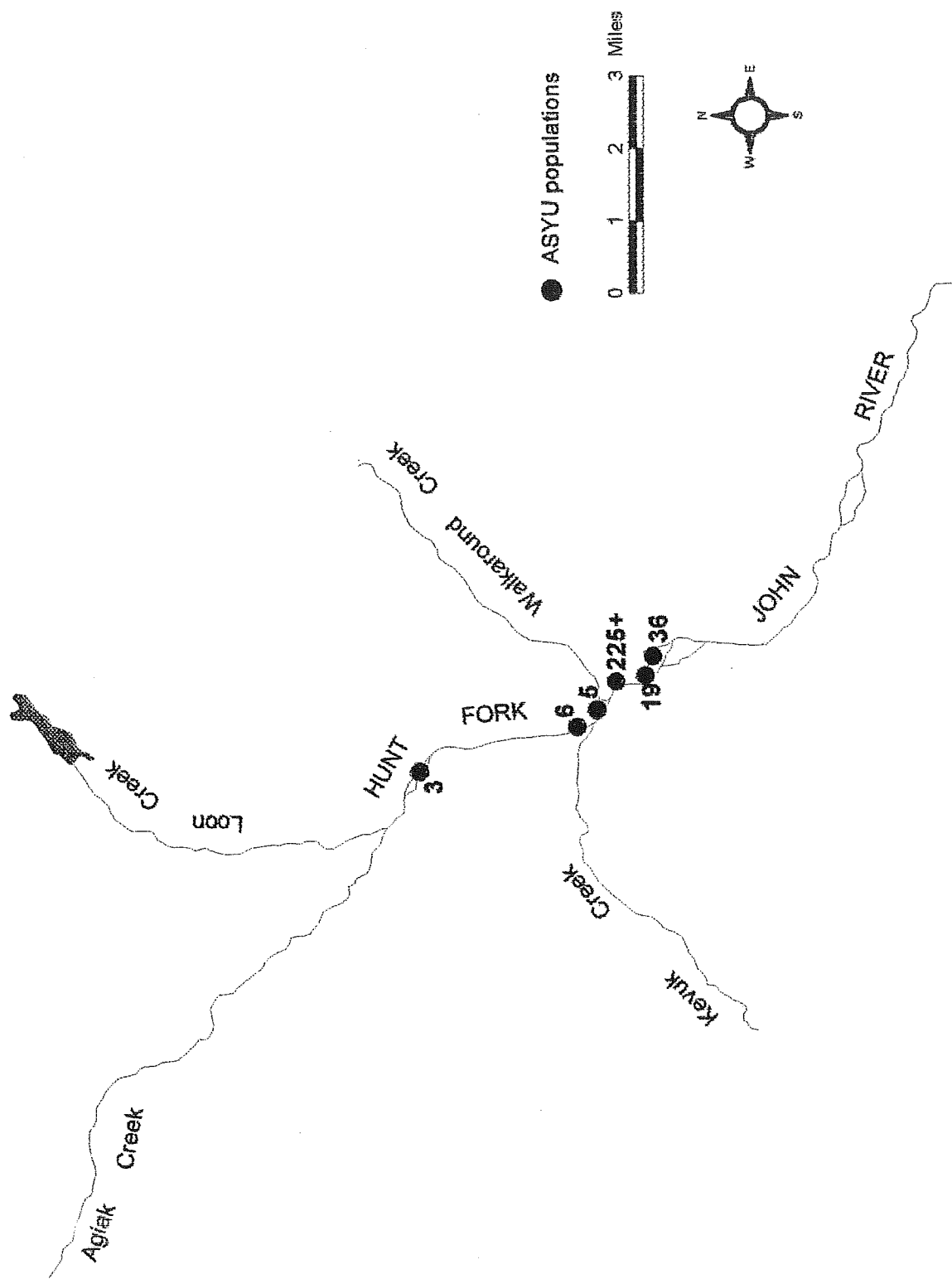


Fig. 3. Study area and *Asfer yukonensis* (ASYU) populations found along the Hunt Fork John River, Gates of the Arctic National Park and Preserve, Alaska, July 1996.

topography are similar, why does *A. yukonensis* grow in one place and not in another? I suspect that rivers may play a role in the distribution of this plant, not so much as a water source, but as an agent for substrate deposition. The timing and amount of flooding, and patterns of substrate deposition, may be critical in developing suitable habitat for Yukon Asters.

## MANAGEMENT IMPLICATIONS

Searches for *A. yukonensis* are scheduled to continue in 1997 in Gates of the Arctic National Park and Preserve. Beyond documenting the abundance and distribution of Yukon Asters, resource managers will also record environmental factors such as substrate characteristics and proximity to running (or flooding) water.

As more areas are searched and more populations found, the probability that *A. yukonensis* may be removed from the Species of Concern list increases. More knowledge about the range and distribution of the Yukon Aster will enable managers to decide what further action is required, whether the plant deserves active protection, or whether no special action is necessary.

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